

## Largest German Solar Power Storage Park

**Solar Cells, Batteries, and Power Inverters in a 1-MW Plant Generate and Buffer Solar Electricity Compatibly with the Power Grid / New and Safe Technology as a Building Block for the “Energiewende”**



*New technologies for the “Energiewende” are being tested in the solar power storage park on Campus North of the KIT. (Photo: KIT)*

**Which technologies will make the “Energiewende” succeed? How do we protect our lead in innovation in international competition? One possible answer can be provided by Germany’s largest solar power storage park. Solar cells, batteries, and inverters are operated together with the purpose of storing solar electricity and making it available at any time. On the occasion of the Baden-Württemberg Sustainability Days, the KIT today commissioned the 1-MW facility together with its Solar-Watt and Kostal Solar Electric partners.**

“Innovation is a core activity of the KIT,” explains Professor Dr.-Ing. Holger Hanselka, President of the KIT. “Together with our partners, we are developing in this solar power storage park forward-looking solutions and systems configurations sustainable on a global market.”

“This new research infrastructure allows us to study, on a relevant scale, the interplay of the latest generations of solar modules, power converters, and lithium-ion batteries,” explains KIT Project Leader



*KIT Energy Center: Having future in mind*

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Dr. Olaf Wollersheim. Controlled by novel forecasting and regulation processes, the batteries store the electricity from the sun, in this way eliminating noon-time peak generation. The electricity stored can then be delivered on demand, for instance, in the evenings, at night or in the morning. Achieving a complete balance of electricity generation and demand would be an important building block for the “Energiewende.”

The research facility contains a setup of more than 100 different systems configurations differing, for instance, in their east-west orientation, inclination, or technical components. Performance data are logged and analyzed continuously. Scientific evaluation will show which systems configurations are compatible with the power grid and cost-effective. “In this way, we want to make a contribution to a science-based strategy towards the goal of achieving 50% of renewable electricity generation by 2030,” explains Wollersheim.

“Modern photovoltaic modules incorporating German know-how are a USP on the international market,” says Detlef Neuhaus, Managing Director of solar module manufacturer SOLARWATT. The solar module open-air laboratory contains installations of the most recent solar modules for testing energy yield and aging behavior under real conditions of operation. “Joint research with the KIT in a facility this size opens up the possibility to us to maintain our lead in know-how.”

“We are happy to be able to participate in this forward-looking project and, in this way, make another contribution towards a successful ‘Energiewende’,” says Werner Palm, Managing Director of inverter manufacturer KOSTAL Solar Electric. Power inverters are components of power electronics converting the direct current produced in solar modules into alternating current for the power grid. They are the central link and switching point connecting solar modules, batteries, and the power grid, in this way greatly contributing to grid stability despite fluctuations in input. “The new facility allows us to simulate the different requirements to be met by power inverters. This test field opens up an excellent advantage to us for innovative and commercially viable further development of our PIKO inverters. This advantage has a direct impact on our claim to provide ‘intelligent links’.”

The new solar power storage plant also produces economic benefits in addition to gains in scientific knowledge. The electricity generated in scientific operation is used on KIT Campus North to run large scientific installations. In this way, roughly 2% of KIT’s power requirement can be met in a year. A total of approximately EUR 1.5

million has so far been invested into the facility. This is offset by annual cost savings of approx. EUR 200,000 over a plant life of approx. 20 years.

The solar research park was developed and built within the Competence E KIT project. The Competence E project combines the research aspects of economic relevance, from materials for batteries to electric storage systems, in a way unique in Germany. The open technology platform for battery-operated electric vehicle propulsion and stationary power storage systems is a systemic approach towards the development of industrially applicable solutions and their production processes. Thanks to integration along the value chain, the ambitious goal is to be addressed to manufacture, by 2018, battery systems with a power density of 250 watthours/kg at costs of EUR 250 per kilowatthour. This will constitute an important step towards the “Energiewende” and in the interest of meeting the goals of climate protection: increased storage capacity of stationary stores to balance out fluctuations in renewable-energy generation, and range extension of electric vehicles in an effort to improve acceptance.

More on the Competence E project can be found under

<http://www.competence-e.kit.edu/>

#### **About the Partners:**

**SOLARWATT** GmbH was founded in 1993, is headquartered in Dresden and works europeanwide as one of the leading German manufacturers of photovoltaic solutions, from high-grade solar modules made in Germany to intelligent energy systems for private and industrial uses. The company employs more than 140 staff members.

**KOSTAL Solar Electric** GmbH headquartered in Freiburg was founded in 2006 under the roof of KOSTAL Industrie Elektrik as the youngest member of the KOSTAL Group, an internationally active German family-owned company of Lüdenscheid with more than 100 years of tradition. With its subsidiaries in Spain, France, Italy, and Greece, the company is responsible for the international distribution of PIKO power inverters.

**The Karlsruhe Institute of Technology (KIT) is one of Europe’s leading energy research establishments. Research, education, and innovation at KIT foster the energy turnaround and reorganization of the energy system in Germany. For this, KIT links**

**excellent competences in engineering and science with know-how in economics, the humanities, and social science as well as law. The activities of the KIT Energy Center are organized in seven topics: Energy conversion, renewable energies, energy storage and distribution, efficient energy use, fusion technology, nuclear power and safety, and energy systems analysis. Clear priorities lie in the areas of energy efficiency and renewable energies, energy storage technologies and grids, electric mobility, and enhanced international cooperation in research.**

**The Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. Research activities focus on energy, the natural and built environment as well as on society and technology and cover the whole range extending from fundamental aspects to application. With about 9400 employees, including more than 6000 staff members in the science and education sector, and 24500 students, KIT is one of the biggest research and education institutions in Europe. Work of KIT is based on the knowledge triangle of research, teaching, and innovation.**

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